

ART. XVIII.—*Revision of the New Zealand Stomatopoda.*

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IN the year 1891 I published a paper on the New Zealand *Squillidae*, stating what was known of the group at that time. Only two species were then known with certainty to occur in New Zealand—viz., *Squilla armata* Milne-Edwards and *Lysiosquilla spinosa* (Wood-Mason); but two other species—*Squilla nepa* Latreille and *Protosquilla trispinosa* (White)—had been recorded from New Zealand, though they were not represented in any of the local collections.

A few years later an important paper was published by R. P. Bigelow on the *Stomatopoda* collected by the "Albatross" between 1885 and 1891, and this paper incidentally contains a considerable amount of additional information on the New Zealand forms. Further references to some of them have also been made by A. Milne-Edwards in the "Mission du Cap Horn" and by Stebbing in his report on the South African *Crustacea*. Owing to the habits of these *Crustacea* they are not very frequently met with, but during the years since the publication of my paper some additional specimens have been collected, and in working out some from the "Nora Niven" collection I have been led to revise the few species that are known to occur in New Zealand and to present the results in this paper. In it I record one species, *Lysiosquilla brazieri*, which had not been previously known from New Zealand seas. I have also a specimen which is undoubtedly the same as those referred to *Squilla nepa* by Heller, but now known under the name of *Squilla affinis* Berthold, so that this species, which was previously considered doubtful, does occur in New Zealand: further, I am able to give some additional information on *Squilla armata*.

As regards their distribution, it may be noted that the four species that are certainly known to occur in New Zealand are all widely distributed, none of them being confined to the New Zealand region. *Squilla armata* extends around the globe in southern seas, *S. affinis* reaches to Hong Kong and Japan, *Lysiosquilla spinosa* is found in the Indian Ocean, and *L. brazieri* occurs in Australia, and is probably identical with *L. latifrons* from Japan.

For their kindness in supplying me with specimens I have to thank Mr. A. Hamilton, of the Dominion Museum; Mr. F. W. Hesse, of the Wanganui Public Museum; Mr. Edgar R. Waite, of the Canterbury Museum; and Professor W. B. Benham, of the Otago Museum.

I have given only those references which appeared necessary for New Zealand students, and I have added brief diagnoses of the genera and species where this seemed desirable.

Protosquilla trispinosa (White).

Gonodactylus trispinosus White, List Crust. Brit. Mus., p. 87, 1847; Miers, Cat. N.Z. Crust., p. 90, 1876. *Protosquilla trispinosa* Chilton, Trans. N.Z. Inst., vol. 23, p. 61.

This species has been recorded by Heller from Auckland. It is widely distributed in Australian and Indo-Pacific seas, but, so far as I am aware,

is not yet represented in any local collection. It is quite possible that it may occur in the northern part of New Zealand, and the recent rediscovery of some of the species assigned to New Zealand by Heller which were thought at one time to be errors makes it desirable to keep this species still on the list as a possible occasional visitant to New Zealand seas.

Genus SQUILLA Fabricius.

Diagnosis.—"Stomatopoda having the telson attached to the 6th abdominal segment by a movable joint; the hind-body depressed and wide; the dactylus of the raptorial claw with usually not more than 6 teeth; as a rule, more than 4 intermediate denticles on the telson, which is usually longer than wide; and the inner basal spine of the uropod the longer of the two." (Bigelow.)

Squilla armata Milne-Edwards.

Squilla armata Milne-Edwards, Hist. Nat. Crust., vol. 11, p. 521, 1837; Gay, Hist. de Chile, Zool., vol. 3, Crust., p. 223, 1849; Miers, Ann. Mag. Nat. Hist., ser. 5, vol. 5, p. 25, 1880; A. Milne-Edwards, Mission du Cap Horn, p. F53, 1891; Chilton, Trans. N.Z. Inst., vol. 23, p. 60, 1891; Whitelegge, Memoir Aust. Mus., vol. 4, pt. 2, p. 199, 1900; Stebbing, South African Crustacea, pt. 2, p. 45, 1902; Bigelow, Proc. U.S. Nat. Mus., vol. 17, p. 515, figs. 9 and 10, 1895. *Chloridella armata*, M. J. Rathbun, Proc. U.S. Nat. Mus., vol. 38, p. 609, 1910.

Specific Diagnosis.—"Eyes large, triangular, dactylus of the raptorial limb with 7 to 9 teeth; rostrum narrowed in front with a slight median elevation; carapace with median carina obsolete or entirely absent, intermediate and lateral carinae present only on the posterior lateral lobes, anterior lateral angles produced into acute spines; lateral spines of the 5th thoracic segment narrow, straight, and acute, the lateral processes of the next two segments broadly rounded and produced into spines that point backward; 8 carinae on the abdominal segments; telson with a crest and a keel and a series of curved lines of pits on each side, 6 marginal spines, the submedian pair with movable tips, no submedian denticles, 10 to 11 small intermediate ones, and 1 lateral one." (Bigelow.)

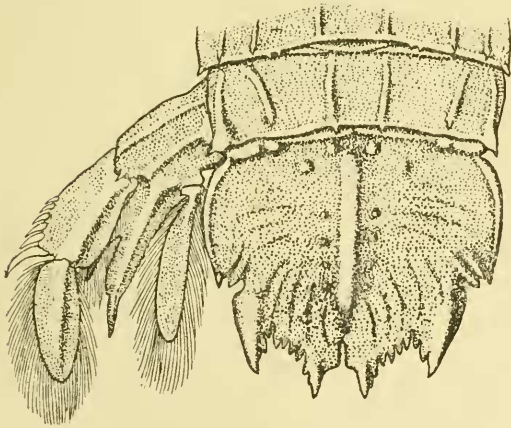


FIG. 1.—*Squilla armata*: Telson and uropod.

Length of largest specimen examined, 135 mm.; usual length, 60-80 mm. This species is probably common in New Zealand seas, though it is only occasionally met with, most of the specimens in local museums having

median elevation; carapace with median carina obsolete or entirely absent, intermediate and lateral carinae present only on the posterior lateral lobes, anterior lateral angles produced into acute spines; lateral spines of the 5th thoracic segment narrow, straight, and acute, the lateral processes of the next two segments broadly rounded and produced into spines that point backward; 8 carinae on the abdominal segments; telson with a crest and a keel and a series of curved lines of pits on each side, 6 marginal spines, the submedian pair with movable tips, no submedian denticles, 10 to 11 small intermediate ones, and 1 lateral one." (Bigelow.)

been obtained from the stomachs of fish. I have seen specimens that were dredged in Wellington Harbour (T. W. Kirk); two fine specimens from Petone Beach, now in the collection of the Dominion Museum; others obtained during the "Nora Niven" expedition, in the stomach of a *Dasybatus* (Waite); two specimens from Kaikoura, in the stomach of an *Alepisaurus ferox* (A. D. Goodall). It has also been recorded from the Auckland Islands by Miers.

Distribution.—Widely distributed in southern seas, having been recorded from South America, South Africa, and Australia.

Remarks.—The specimens examined agree closely with the brief diagnosis given by Bigelow as quoted above. The median elevation on the rostrum is hardly appreciable, and the carinae on the carapace are only very slightly marked, especially in the smaller specimens. The submedian spines on the telson have movable tips, as described by Bigelow, in the smaller specimens, but in larger specimens the tips have become obsolete or been worn off. The curved lines on the sides of the median carina of the telson are fairly distinguishable, though the surface itself is quite smooth.

My specimens agree also with the more detailed description given by Bigelow, except that in smaller specimens the intermediate and lateral carinae do not end in spines in the four or five anterior abdominal segments; "the 1 to 4 small spines half-way between the median and intermediate carinae" on the posterior margin of the 5th segment of the abdomen appear to be constantly present.

In the characters of the telson and in some other points this species appears to approach pretty closely to *Squilla lata* Brooks from the Arafura Sea (see fig. 1).

Milne-Edwards, in the "Mission du Cap Horn," considers *S. gracilipes* as probably a variety of *S. armata*, and certainly, as he points out, the number of spines on the dactyls of the raptorial limbs is subject to variation, so that the possession of 10 in *S. gracilipes* is not sufficient in itself to distinguish it from *S. armata*; but Miers describes *S. gracilipes* as having 26 denticles (*i.e.*, 13 on each side) between the submedian marginal spines, and about 18 on each side between the submedian and the first lateral spines. In none of the adult specimens of *S. armata* that I have been able to examine are there any denticles between the median fissure and the submedian spine except in one instance where there are one or two small traces of a denticle, and Bigelow has drawn attention to the same fact, so that in this point there is a pretty considerable difference between *S. gracilipes* and *S. armata*; and there are other points drawn attention to by Miers which make it difficult to consider these two forms as specifically identical.

I have one small specimen, collected at Sumner, that is only 20 mm. in length; but since it has the submedian and lateral carinae faintly marked on the posterior abdominal segments, and ending in spines on the 6th

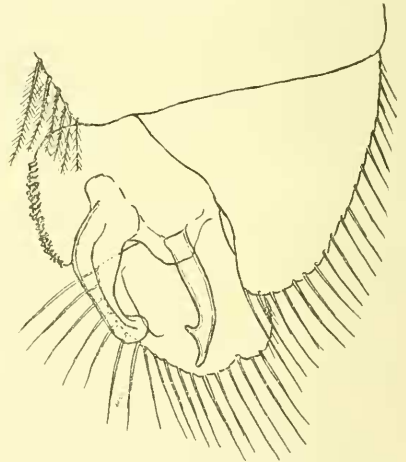


FIG. 2.—*Squilla armata*: Endopod of first pleopod of male.

segment, it must, I think, belong to *S. armata*. In it the terminal segment shows little or no median fissure, and there are 12 small sharp teeth on each side between the median line and the submedian spine, and 16 between the submedian and lateral teeth, all these teeth being sharply pointed and occasionally irregular, with a small one in between two of the ordinary size. The raptorial limbs on each side bear 7 teeth on the dactyl.

In the character of the terminal segment and also of the uropods this small specimen appears to agree closely with Miers's description and figure of *S. gracilipes*; that species, however, is much larger—viz., 85 mm. long ("3½ in.")—and presumably adult, and the dactyls of the raptorial limbs bear 10 teeth.

As Bigelow has pointed out, there are no secondary sexual differences in *S. armata*. The endopodite in the first abdominal appendage in the male is specially modified in the usual manner, and, as this appendage has not been described in this species, I represent it in fig. 2. It will be seen that it conforms closely to the type found in other species of *Squilla*, and a detailed description of it appears to be unnecessary.

Squilla affinis Berthold.

Squilla affinis Berthold, Abhandl. k. Gesellsch. Wiss. Göttingen, vol. 3, p. 26, 1845; Bigelow, Proc. U.S. Nat. Mus., vol. 17, p. 538, fig. 22, 1895 (with synonymy). *S. oratoria* De Haan, Siebold's Fauna Japon. Crust., p. 223, 1850; Stebbing, South African Crustacea, pt. 4, p. 44, 1908. *S. nepa* Miers, Cat. N.Z. Crust., p. 89, 1876, and Ann. Mag. Nat. Hist. (5), vol. 5, p. 25, 1880 (in part); Chilton, Trans. N.Z. Inst., vol. 23, p. 60, 1891.

Bigelow has pointed out that under the name *Squilla nepa* two species have been confused. These species differ mainly in the eyes, one form having them small and with the corneal axis about three-fourths the length of the perpendicular one and at right angles to it, while in the other the eyes are large, triangular, with the corneal axis oblique and as long as or longer than the perpendicular one. The form with the smaller eyes he considers to be the true *S. nepa* Latreille, while the other form he assigns to *S. affinis* Berthold. Mr. Stebbing upholds *S. oratoria* De Haan as prior to *S. affinis* Berthold, and therefore the correct name for the species.

Squilla nepa was recorded from Auckland by Heller, but there has been nothing to indicate which of these two species was intended, and up till the present time no further specimen has been obtained by local collectors, and consequently the occurrence of this species in New Zealand has been considered doubtful.

Among the *Squillidae* in the Dominion Museum kindly placed at my disposal by Mr. Hamilton there is a single dried specimen which, though imperfect, evidently belongs to *S. affinis* Berthold as described by Bigelow. The eyes are imperfect, but there is sufficient of them left to show that they

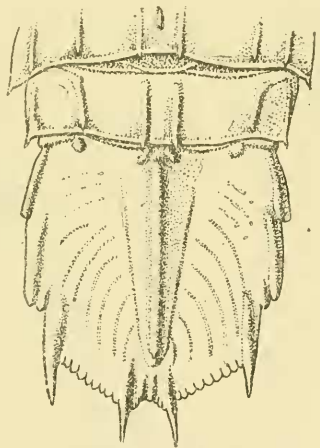


FIG. 3.—*Squilla affinis*: Telson.

were large, triangular, and with the corneal axis oblique, while the carinae on the carapace agree precisely with the description and figure given by Bigelow, and in themselves are sufficient to show that the specimen belongs to *S. affinis* and not to *S. nepa*. The specimen also agrees with his description in all the other characters that can be still seen. Unfortunately, the exact locality of this specimen is not known.

The species *S. affinis* is known from various localities in Japan and also from Hong Kong, and its occurrence in New Zealand indicates a distribution similar to that of numerous other marine *Crustacea*.

The species is described by Bigelow as follows: "A *Squilla* with large triangular eyes, the corneal axis being oblique and as long as or usually longer than the peduncular one and 0.05 times the length of the body; the outer margin of the dactylus of the raptorial claw not sinuate or only slightly so; 6 teeth on the dactylus; the rostrum slightly truncated, and supplied with marginal carinae and a median tubercle; 5 carinae on the carapace, the median one not bifurcated for more than one-fourth its length, and the lateral ones continued into the anterior lateral spines, which do not reach as far forward as the suture between the rostrum and carapace, the posterior lateral angles evenly rounded; no ventral spine on the first exposed thoracic segment, its lateral processes and those of the next two segments bilobed as in *S. nepa*; submedian carinae present on all except the first segments of the hind-body; crest, keel, and symmetrical lines of pits on the telson and 6 marginal spines, 8 basal carinae, and between the former 4 to 5 submedian, 7 to 9 intermediate, and 1 lateral denticle."

I give a figure representing the telson. (See fig. 3.)

Genus *LYSIOSQUILLA* Dana.

"*Stomatopoda* having the 6th abdominal segment separated from the telson by a movable joint; the hind-body depressed, loosely articulated,

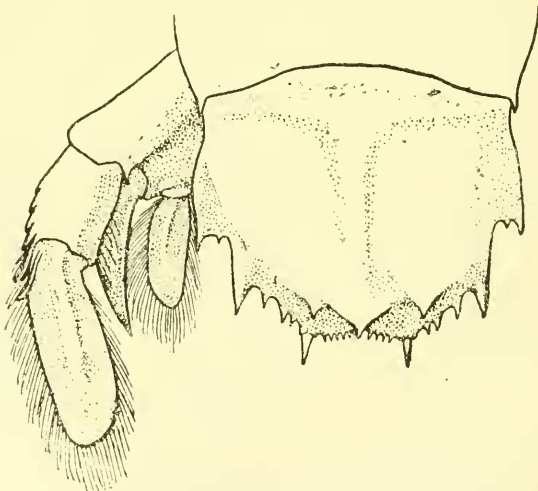


FIG. 4.—*Lysiosquilla spinosa*: Telson and uropod.

and wide; the dactylus of the raptorial claw without a basal enlargement, but with not less than 5 marginal teeth; no more than 4 denticles, and often

only 1, between the intermediate and submedian marginal spines of the telson, which is usually wider than long; and the outer spines of the basal prolongation of the uropod usually longer than the inner one." (Bigelow.)

Lysiosquilla spinosa (Wood-Mason).

Coronis spinosa Wood-Mason, Proc. Asiatic Soc. Bengal, 1875, p. 232.

Lysiosquilla spinosa Chilton, Trans. N.Z. Inst., vol. 23, p. 61, 1891 (with synonymy).

This species is fully described in my previous paper quoted above. Since then I have seen specimens in the Otago Museum from Resolution Island, "dug in the sand" (R. Henry, 1900), and Stewart Island (T. J. Parker); one imperfect specimen was obtained during the cruise of the trawler "Nora Niven" (Waite), and quite recently Miss S. D. Shand has sent me a specimen from the Chatham Islands.

I give a figure of the telson and uropod for comparison with those of the other species.

Lysiosquilla brazieri Miers.

Lysiosquilla brazieri Miers, Ann. Mag. Nat. Hist. (5), vol. 5, p. 11, pl. 1, figs 3-6, 1880; Haswell, Cat. Aust. Crust., p. 206, 1882.

Two dried specimens in the Wanganui Public Museum, which have kindly been placed at my disposal by the Curator, Mr. H. W. Hesse, seem certainly to belong to this species, agreeing well with the figures and description given by Miers, except that there are only 10 spinules on each side on the posterior margin of the terminal segment instead of 14; there is also a slight median sinus.

As Miers pointed out, this species is evidently closely allied to *L. latifrons* De Haan, and the two specimens that I have been able to examine seem to connect these two species still more, for they bear only 10 minute spinules, as in *L. latifrons*, and there is a slight indication of a sinus on the posterior margin of the terminal segment: they agree, however, with *L. brazieri* in having the appendages of the last pair of thoracic limbs almost linear, while these are described as being ovate in *L. latifrons*.

I think there is probably little doubt that these two species should be combined, but as I have only two imperfect dried specimens, and am unable to consult any description of *L. latifrons* beyond that given by Miers, I leave the decision of this question open for the present.

A specimen of this species was sent to me in 1894 by the late Mr. S. H. Drew, then Curator of the Wanganui Public Museum, who informed me that in 1885 thousands were washed ashore at Otaki, the beach being strewn for miles after a heavy south-west gale, the animal never having been seen before or since. The specimen I then examined was a very imperfect one, and I was unable to identify it and merely recorded in my note-book that it differed considerably from *L. spinosa* in the arrangement of the spines on the terminal segments. The two specimens now examined are evidently from the same lot, having been obtained at Otaki in 1885 by Mr. Lee, and they have enabled me to identify the species as above. I have seen no other specimens.

L. brazieri is recorded from Port Jackson, New South Wales; *L. latifrons* from Japan.